

Trimming Solutions from the October 2002 Issue of Mid-Hudson Modelmasters' Wing Tips, Jesse Aronstein, Editor

The following two responses were to a question in a previous issue by John Stophan re difficulty trimming his 16" Stearman, which he had built light.

Don Typond's Response: The general rule of thumb is: "Control the glide with flying surface and balance (CG) adjustments. Control the climb with thrust adjustments. "

John apparently got the glide part correct, with some right turn trimmed in. Under power it climbed "at a fair angle" in a straight line. Then it dropped the left wing and spiral-dived.

Power makes the model want to turn, and/or roll, to the left. Some people call it "P-factor" (for prop-factor, a combination of asymmetric thrust from a propeller at a high angle of attack (i.e. the descending blade on the right is taking a bigger bite out of the air than the ascending blade on the left — ed.), and the spiral slipstream striking the left side of the vertical fin, both contributing to yawing the airplane to the left), and some call it "torque." Either way, the result is a turn to the left under power.

This explains why the model started upward in a straight line though you had it trimmed for a right turn. The right trim was counteracted by the left "torque," and the model climbed straight. The drop-off to the left was probably the result of a stall. He said it climbed at a "fair angle." Could it have been a "steep" angle? A stall under power will result in a roll to the left, followed by a dive.

Cure: Add right thrust by shimming the noseblock. This will help to neutralize the left torque effect. Add downthrust to reduce the climb angle to prevent stalling. Since it's already trimmed for a right-turn glide, it should be trimmed for right turn under power also. A right-right pattern usually prevents the dreaded left torque spiral dive. Add thin shims one at a time until it is right. Good luck!

Jesse Aronstein's Response: Sounds like a classic wing tip stall. The high climb on very few turns suggests that it either needs downthrust or has excess pitch stability. Assuming of course, that you are right that there are no warps (and that the wings have the same angle of incidence, etc.). Check by using a few dowels or balsa sticks against the bottom of the wing as visual incidence indicators. That's more accurate than eyeballing from the rear.

For trimming, check the pitch stability first. On a test glide, he says it glides normally. If the launch speed is increased, it should pitch nose up slightly, and maybe a gentle stall. If it pitches up more than "slightly" (you be the judge) correct this with a little "down" trim at the elevator, in combination with balance change. In other words, if it pitches up violently when launched at higher speed, give "down" trim at the elevator and then restore the normal glide by moving the CG back (remove nose weight or add tail weight). Sounds crazy, right? If it stalls - move the CG back. But, in combination with the elevator trim, that's the way to cure excess pitch stability.

On the other hand, the fact that it does not recover once pointed downward may indicate too little pitch stability. Again, back to the test glides. If it doesn't have some tendency to nose up if the launch speed is increased, then add some "up" elevator trim and move the CG forward.

Once pitch stability is OK, you should then adjust the thrust line to trim the power flight. Lastly, the source of the problem might be propeller stall, which can be corrected by decreasing the pitch.

One more item - do your test gliding and flying over "tall grass", as the flying instructions always used to

say. Less likely to break the wing again.

Jesse